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ABSTRACT

Four units focusing on 16 different Black scientists or inventors who have contributed to American life and research are presented. As part of an interdisciplinary high school science course, the units are designed to help students develop an understanding of and appreciation for the talents of the individuals studied, motivate minority students to develop a positive self image, and help all students grasp an appreciation for these undiscovered geniuses. Each unit provides a brief biographical sketch of the four people to be studied, a drawing of each of their faces, suggestions for student and teacher activities, and evaluation procedures. Activities include role playing, simulations, interviews, field trips, research, and individual and group work. A bibliography is provided. (DC)

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# CURRICULUM GUIDE

DEPARTMENT OF SCIENCE

CAMBRIDGE RINDGE AND LATIN SCHOOL

# BLACK SCIENTISTS AND INVENTORS

# IN THE UNITED STATES

1731 - 1980

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Grade Level - High School

Subject Level - Science



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DEDICATED TO MY FATHER

James Walter Barrow, M.D.

Born June 16, 1887 - British Guiana, South America

This Science Unit on Black Scientists and Inven ors from 1731 to 1980 is dedicated to James W. Barrow (1887-1962) who became in medicine a General Practioner against seemingly insurmountable odds, but who had determination and the will to help his people. He died in Cambridge, Massachusetts, July 10, 1962.

Benjamin Banneker

Norbert Rillieux

Elijah McCoy

Granville T. Woods

PHILOSOPHY: 1.

This course was developed to acknowledge the contributions of black scientists and inventors who have made their mark in American life and research.

Black scientists have contributed to the quality of life in the United States as far back as the Sixteenth Century, when Benjamin Banneker invented the first wooden clock. Realizing the importance of including all contributors to our scientific world, this course will show how black men used their ingenuity to invent devices which would make their daily tasks less arduous, i.e. Elijah McCoy, and in many instances became an aid to mankind, i.e., William A. Hinton.

Four units will be developed during each quarter of the school year to show how these scientists and inventors made outstanding contributions in a very short span of time, despite in many cases, insurmountable odds of education, or the lack of it, prejudice, and lack of recognition.

These units have further been developed to help all students regardless of ethnicity to have a wider knowledge concerning the scientific fields around them. While there have been many other men and women in the scientific arena who have made significant achievements, the scope of this paper is not equipped to deal with all of them now. However, a future paper could be evolved based on minority women in science and others when such information is more fully documented.

GENERAL GOALS:

To enable the student to gain insights into the scientific capabilities of scientists and/or inventors regardless of color or race and to show how these men despite their lack of formal schooling in many instances, paralleled their majority counter-parts by pre-dating their discoveries of inventors and scientists who are generally known.

SPECIFIC OBJECTIVES:

Upon completion of Units I, II, III, and IV:

1. Students should have developed an understanding of and an appreciation for the talents of sixteen black scientists and inventors named in the four units.
2. Minority students should have been motivated to develop a positive self-image by studying the lives of the sixteen scientists and inventors.
3. All students should have grasped an appreciation for these undiscovered geniuses.

GENERAL STRUCTURE AND ORGANIZATION:

This course was developed to help students become aware of the contributions black scientists and inventors have made to the American life and research.

Interwoven into each unit are class activities which should encompass Biology, Chemistry, Physical Science, Astronomy, Physics, Ecology and any other sciences taught at Cambridge Rindge and Latin School.

The mechanism by which these four units will be taught will include role-playing, simulations, individual and group activities.

Since the students are to be encouraged to initiate inquiry and to gain self-confidence and pride in their discovery of these men, lecture will be at a minimum.

All activities included in the course have been designed to provide realistic and participative experiences that will help the student develop the ideas discussed in each unit of the course. This course should be given as an introduction to each new unit throughout the year or whenever it is feasible.

The course has been divided into four units:

UNIT I: Early Black Inventors—1731-1928

LENGTH: Approximate two weeks per unit--five periods per day, five days per week.

ACADEMIC LEVEL: High School

OUTLINE: 1. BENJAMIN BANNEKER - Inventor, Mathematician, Gazeteer

2. NORBERT RILLIEUX - Inventor

3. ELIJAH McCOY - Inventor

4. GRANVILLE T. WOODS - Inventor

OBJECTIVES:

1. Students will develop an understanding of and an appreciation for the talents of Benjamin Banneker (1731 - 1806); Norbert Rillieux (1806-1894); Elijah McCoy (1844-1928); and Granville T. Woods (1856-1910)

2. Minority students will be motivated to develop a positive self-image by studying the lives of Banneker, Rillieux, McCoy and Woods.

3. All students will have grasped an appreciation for the previously undiscovered geniuses.

PROCEDURE:

Banneker - Give students a brief outline of Benjamin Banneker's life - How he made the first "striking" wooden clock in America. How he was born in Maryland of a "free" mother and a slave father in 1731. How he attended a private, integrated school and had the equivalent of an eight grade education. How his aptitude in mathematics and his knowledge of astronomy enabled him to predict the solar eclipse of 1789. How he later published a yearly almanac which contained data and tables on future eclipses. How he was the first Negro to write a scientific book. And how Banneker's greatest contribution stems from his service as a surveyor of what was to be the Capitol of the United States in Washington, D. C. His death, 1806.

Rillieux - Give brief outline of the life of Norbert Rillieux. How he was a great inventor, a native of New Orleans, Louisiana, born March 17, 1806, the son of Vincent Rillieux, a wealthy engineer, and Constance Vivant, a slave on his plantation, obtained his higher education in Paris, where his extraordinary aptitude for engineering led to his appointment at the age of 24 as an instructor at a French school of engineering. Also how in his early life he developed a device used in sugar refining industry known as the"Vacuum Evaporator" which reduced the need for gangs of slaves laboriously ladling boiling sugar cane from one kettle to another or what was called "The Jamaica Train." His death, October 6, 1894, leaving as a memorial to his genuis, a system which is in universal use throughout the sugar industry, and the manufacture of soap, gelatin, glue, and many other products.

Jan E. Matzeliger

Charles Drew

Martin Delany

George Washington Carver

McCoy - Give brief outline of the life of Elijah McCoy. How he, through his inventions dealing primarily with the lubrication of moving machinery, designed the "drip cup" - a device which was a key to perfecting the overall lubrication system used in large industry today. How he was born in Canada in 1844 and became a resident of Ypsilanti, Michigan after the Civil War. How he acquired more than fifty patents for devices designed to streamline his automatic lubrication process. His death, believed to have been in 1928.

Woods - Give a brief outline of Granville T. Woods' life. How as a very gifted inventor he was born in Columbus, Ohio, in 1856. How he only attended school to the age of ten years but worked in machine shops and steadily improved as the years went by. How during his lifetime he obtained about fifty patents, including one for an incubator which could hatch thousands of eggs at a time. How in 1887 he patented the most advanced of his many inventions, the Synchromous Multiplex Railway Telegraph. His death, in New York in the year 1910.

EVALUATION:

Students will be given an un-graded objective test on the four personalities aformentioned.

Students will write a one-page paper highlighting the major contributions made by each scientist or inventor.

UNIT II: Black Scientists and Inventors 1812-1950

LENGTH: Approximately two weeks per unit, five periods per day, five days per week

ACADEMIC LEVEL: High School

OUTLINE:
1. Jan E. Matzeliger - Inventor
2. Charles Drew - Scientist
3. Martin Delany -Scientist
4. George Washington Carver - Scientist

OBJECTIVES:

1. Students will develop an understanding of and an appreciation for the talents of Jan E. Matzeliger (1852-1889); Charles R. Drew (1904-1950); Martin Delany (1812-1885); George Washington Carver (1864-1943).
2. Minority students will be motivated to develop a positive self-image by studying the lives of Matzeliger, Drew, Delany, and Carver.
3. All students will have grasped an appreciation for the previously undiscovered geniuses.

Daniel Hale Williams

Ernest E. Just

Ulysses Grant Dailey

William Hinton

PROCEDURE:

Matzeliger - Give students a brief outline of Jan Matzeliger's life. How he was born in Dutch Guiana in 1852. How he started working with machines at the age of ten. How he invented the shoe-lasting machine and made Lynn, Massachusetts, the "shoe capital of the world." How he designed and patented a shoe last which could cut, sew, tack as well as design the last of a shoe. His death, 1889.

Drew - Give students a brief outline of Charles R. Drew's life. How he became famous because of his advanced research in the vital field of blood plasma, the technique which he developed for separating and preserving blood, all of which helped save countless lives during World War II. How he, in fact, was the founder of the now famous Blood Bank. His death, at the age of 46 as the result of an automobile crash in 1950.

Delany - Give students a brief outline of Martin Delany's life. How he was born in Charleston, West Virginia in 1812. How he, in 1843, founded his own newspaper called "The Mystery", in which he wrote protest articles against the institution of slavery. How he enrolled in the Harvard Medical School in 1849. How he became the first black field officer in the Civil War. How Delany was a journalist, physician and officer, truly a credit to his people. His death, 1885.

Carver - Give students a brief outline of George Washington Carver's life. How he was born a slave in 1864 in Diamond Grove, Missouri. How he was working as a farm hand at the age of 13. How he managed to get a high school education and the first Negro to be admitted to Simpson College in Indianola, Iowa. How he received a degree in Agricultural science from Iowa State University in 1894, two years later received a Master's Degree from this same school, and later taught on the faculty at that school. How his fame earned him a job on the faculty of Tuskegee Institute, Tuskegee, Alabama. How he did many things to raise the dietary standards of poor blacks in the area, making use of simple foods such as peanuts, cow-peas, and the sweet potatoe. How through his chemical research Carver produced more than 200 new products from peanuts some of which are flour, coffee, breakfast cereal, milk, leather, dye, medicine and metal polish. His death, 1943.

EVALUATION:

Students will be given an un-graded objective test on the four personalities aformentioned.

Students will write a one-page paper highlighting the major contributions made by each scientist or inventor.

UNIT III: Black Scientists 1858-1961

LENGTH: Approximately two weeks per unit, five periods per day, five days per week

ACADEMIC LEVEL: High School

OUTLINE: 1. Daniel Hale Williams - Scientist

2. Ernest E. Just - Scientist

3. Ulysses Grant Dailey - Scientist

4. William Hinton - Scientist

OBJECTIVES:

1. Students will develop an understanding of and an appreciation for the talents of Daniel Hale Williams (1856-1931); Ernest E. Just (1883-1941); Ulysses Grant Dailey (1885-1961); William Hinton (1883-1959)

2. Minority students will be motivated to develop a positive self-image by studying the lives of Williams, Just, Dailey, and Hinton.

3. All students will have grasped an appreciation for the previously undiscovered geniuses.

PRODEDURE:

Williams - Give a brief outline of the life of Daniel Hale Williams. How he was born in Holidaysburg, Pennsylvania in 1856. How he graduated from Chicago Medical College in 1883. How Dr. Williams opened his office on Chicago's South Side at a time when Chicago hospitals did not allow Negro doctors to use their facilities. How he, because of prejudice, founded Provident Hospital which was open to patients of all races. How in 1893 Dr. Williams performed the operation which resulted in the survival of a patient who had a stab wound in an artery a fraction of an inch away from his heart. This was the first recorded operation on an open heart. His death, 1931.

Just - Give a brief outline of the life of Ernest E. Just. How he was born in Charleston, South Carolina in 1883. How he attended Dartmouth College, Hanover, New Hampshire, graduating magna cum laude with Phi Beta Kappa honors. How he later taught at Howard University, Washington, D. C. where he was one of the founders of the Greek Letter Fraternity, Omega Psi Phi, of which many black men of note are members. How he was the first recipient of the Spingarn Medal in 1915. How he conducted research in marine biology for the United States Government at Woods Hole, Massachusetts. His death, 1941.

Dailey - Give a brief outline of the life of Ulysses Grant Dailey. How he was born in Donaldsonville, Louisiana in 1885. How he graduated from the Northwestern University Medical School where he was appointed a Demonstrator in Anatomy. How he studied in Paris, Vienna, and London and in 1926 set up his own hospital and sanitarium in Chicago. His death, 1961.

Lewis Latimer

Percy Julian

Theodore Lawless

Garrett A. Morgan

Hinton - Give a brief outline of the life of William A. Hinton. How he was born in Chicago, Illinois in 1883. How he was graduated from Harvard College in 1905 and from Harvard Medical School in 1912. How he served as a voluntary assistant in the pathological laboratory at Massachusetts General Hospital. How he served eight years at the Boston Dispensary, and at the Massachusetts Department of Public Health. How he became the first Negro to be granted a professorship at Harvard Medical School. How he is widely known for his study of venereal disease and especially for his "Hinton Test" which he developed for the detection of syphilis.. His death, Canton, Massachusetts in 1959.

EVALUATION:

Students will be given an un-graded objective test on the four personalities aformentioned.

Students will write a one-page paper highlighting the major contributions made by each scientist.

UNIT IV: Black Scientists and Inventors 1848-

LENGTH: Approximately two weeks per unit, five periods per day, five days per week.

ACADEMIC LEVEL: High School

OUTLINE: 1. Lewis H. Latimer - Inventor

2. Percy Julian - Scientist

3. Garrett A. Morgan - Inventor

4. Theodore Lawless - Scientist

OBJECTIVES:

1. Students will develop an understanding of and an appreciation for the talents of Lewis H. Latimer (1848-1928); Percy Julian (1898-1975); Garrett A. Morgan (1877-1963); Theodore Lawless 1892- ).

2. Minority students will be motivated to develop a positive self-image by studying the lives of Latimer, Julian, Morgan, and Lawless.

3. All students will have grasped an appreciation for the previously undiscovered geniuses.

PROCEDURE:

Latimer - Give a brief outline of the life of Lewis H. Latimer. How he was born in Chelsea, Massachusetts, September 4, 1848. How he studied

drafting after completing military service in the Union Navy. How he was employed by Alexander Graham Bell to make the patent drawings for the first telephone. How he became chief draftsman for both the General Electric and Westinghouse Companies. How he invented and patented the first incadandescent electric light bulb with a carbon filament in 1881. His death, 1928.

Julian - Give a brief outline of the life of Percy Julian. How he was born in Montgomery, Alabama in 1898. How he was educated at DePauw University and the University of Vienna. How he headed soybean research at the Glidden Company until he formed his own Julian Laboratories. How his most important contribution to medical research was his method for producing cortisone cheaply. How he learned to synthesize physostigmine, a chemical used in the treatment of glaucoma in 1935. His death, 1975.

Morgan - Give a brief outline of the life of Garrett A. Morgan. How he was born in Kentucky in 1877. How his greatest contribution to public safety was the "Gas Inhalator" first used in a successful rescue operation made necessary by a tunnel explosion which had trapped several men some 200 feet below the surface of Lake Erie. How he invented the belt fastener for a sewing machine, which netted him the total of $150. How he invented the automatic stop sign in 1923 for which he received $40,000 from the General Electric Company. His death, 1963.

Lawless - Give a brief outline of the life of Theodore Lawless. How he was born in Thibodeaux, Louisiana in 1892. How he has become recognized as one of the world's authorities on dermatology, the study of skin diseases. How he was educated at Talladega College, University of Kansas, Columbia, and Harvard. How he received his M.D. Degree from Northwestern University. How his research in syphilis and leprosy led to his receiving the Harmon Award in medicine in 1929 and the Spingarn Medal in 1954. How he along with his private practice also serves as senior attending physician at Provident Hospital, Chicago.

EVALUATION:

Students will be given an un-graded objective test on the four personalities aformentioned.

Students will write a one-page paper highlighting the major contributions made by each scientist and inventor.

STUDENT ACTIVITIES:

Unit I: 1. Students will interview an employee of a sugar refining company and share this information with the class.

2. Students will draft their own layout of the city of Cambridge in the vicinity of the high school. The student giving the most accurate layout will receive an award.

Student activities continued: (Unit I)

3. Students will look up the word "lubrication" and tell in their own words what they think it means.

4. Students will tell how the term "The Real McCoy" originated.

5. Students will go to the library and look up two situations in which the Synchromous Multiplex Railway Telegraph has been used.

Unit II:

1. Students will interview a shoe cobbler and find out how much he knows about Mr. Matzeliger, the inventor of the shoe-lasting machine.

2. Students will get permission from their parents to donate to the Annual Blood Bank Drive held at the school.

3. Students will bring in a newspaper article about anyone in the scientific field and share this information with the class.

4. Students will make a poster showing various uses of the peanut.

Unit III.

1. Students will go to the library and write a one-page paper on the late famed Dr. Paul Dudley White formerly of Massachusetts General Hosp.

2. Students will write a one-page paper about the white shark.

3. Students will outline on a skeleton the parts of the human body.

Unit IV.

1. Each student will be asked to describe a disco dance setting where the incandescent electric light bulbs were used and tell what effect, if any, these bulbs added to the atmosphere.

2. Students will go to the library and write two papagraphs on Glaucoma.

3. Students will write a paper giving their opinion on what they think of the "No Turn On Red" or "Turn On Red" signs. Tell whether Mr. Morgan's invention was better.

4. Students will write a letter to Dr. Nicholas Feumara and ask for material on veneral diseases, especially syphilis, the disease whose research won Dr. Lawless the Harmon Award.

TEACHER RELATED ACTIVITIES:

1. Slide Presentation

Teacher Related Activities continued:

2. Field Trips:
   a. Aquarium
   b. Revere Sugar Refinery
   c. Cambridge City Hospital
   d. Telephone Company
   e. Afro-American Museum
   f. Museum of Science
3. Role Playing
4. Assign Reports
5. Simulations
6. Skits
7. Questions and Answers
8. Oral Reports, Vocabulary, Interviews
9. Speakers
10. Graphic Arts Display

Basis for Assigning Grades for the Course:

1. Student's attitude, effort, sincerity and cooperation will determine the quality of his grade.

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